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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,596	08/05/2003	Huicai Zhong	50432-591	4816

7590 08/11/2005  
McDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER
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BLUM, DAVID S

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/633,596

Applicant(s)

ZHONG ET AL.

Examiner

David S. Blum

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7, 8, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 4-6, 9, 10 and 13-17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

This action is in response to the remarks and amendment filed 6/1/05.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 7-8, and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (US006844604B2).

Lee teaches all of the positive steps of claims 1-3, 7-8, and 11-12 as follows.

Regarding claim 1, Lee teaches modulating the flatband voltage (column 6 line 3) of a high k-dielectric (column 4 line 7) by depositing the high-k dielectric layer (14) and annealing the layer under controlled conditions.

Regarding claim 11, Lee teaches annealing the high-k dielectric and figure 4 shows different voltage values for N and P devices, therefore the high-k films are annealed to two different values.

Regarding claim 2, the controlled parameters include at least one of temperature (column 4 line 53), time, gasses, and anneals.

Regarding claim 3 the annealing temperature is between 400-800 degrees C (column 4 line 53, column 6 lines 63-67).

Regarding claim 7, the step of controlling the flatband voltage includes changing the voltage by at least 0.3 V (figures 4 and 5)

Regarding claims 8 and 12, modulating the high-k dielectric material includes different values for P-channel and N-channel devices (figure 4).

***Allowable Subject Matter***

3. Claims 4-6, 9-10, and 13-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 4 limits the method of modulating the flatband voltage to a plurality of anneals with a different anneal gas in each anneal. Claim 9 limits the step of modulating the flatband voltage to annealing for P-channel devices with N<sub>2</sub> and claims 10 and 13 limit the step of modulating the flatband voltage to preventing the N-channel device from exposure to N<sub>2</sub> (by masking in claim 13.. COMBO Lee (US 006844604B2) is silent as to

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the annealing gas or different gasses for annealing for N and P devices. Barile (US3793090) teaches annealing in oxygen to modulate the flatband voltage but does not teach or suggest multiple anneals with different gasses. That Barile anneals in oxygen may keep the N-channel device from exposure to N<sub>2</sub>, but not by a positive step in that annealing in oxygen does not preclude nitrogen from being a carrier gas and there are no positive steps to prevent exposure.

Claims 4 and 5 depend upon allowed claim 4.

Claims 14-17 depend upon claim 13.

### ***Response to Arguments***

4. Applicant's arguments filed 6/1/05 have been fully considered but they are not persuasive.

The applicant argues that Lee forms a high-k dielectric layer by forming a multi layer of alternate materials and that this is how the flatband voltage is shifted (modulated) rather than by controlled annealing. However, as taught in the instant specification (page 3, paragraph 15), any high-k material may be employed. Thus a multi-layer may also be considered the dielectric layer. Also, whether Lee uses alternate methods for modulating the flatband voltage or not is immaterial. Lee controls the anneal (as in the instant specification) and this also modulates the flatband voltage. Barile (US3793090) teaches that controlling the anneal shifts the threshold voltage (threshold voltage and

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flatband voltage are mathematically related). Thus any anneal affects the flatband voltage and the flatband voltage of Lee is therefore controlled by the anneal of Lee, even though it is not reported.

"[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968) See also *In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

Lee teaches the positive steps of depositing a high-k dielectric and control annealing the high-k dielectric. As taught by Barile, any anneal would affect the flatband voltage, therefore the controlled anneal of Lee modulates (shifts, controls) the flatband voltage of the high-k dielectric layer.

### ***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (571)-272-1702. Our facsimile number all patent correspondence to be entered into an application is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'DSB', followed by a long horizontal line extending to the right.

David S. Blum

August 10, 2005